PhD and Postdoc positions in Earth System Modelling and Machine Learning

Scientific Staff

At the School of Engineering and Design (ED) of the Technische Universität München (TUM), we are offering

1 PhD and 3 Postdoc positions (m/f/d)

in the field of Earth system modelling and machine learning, to be filled as soon as possible.

The successful candidates will be part of the "Earth System Modelling" group at TUM. The PhD position is funded for 3 years, the Postdoc positions for 2 years with possibilities for extension by 2 more years. Remuneration is in accordance with the German public tariff scheme (TV-L), salary group E 13, 100% for the Postdocs (40 hours per week) and 65% for the PhD (26 hours per week). The positions are partly funded by the Volkswagen Foundation via a Freigeist fellowship.

About the project:
In view of ongoing climate change, two key challenges of Earth system science are to predict potential changes in extreme weather events, and abrupt state transitions of potentially multistable subsystems of the Earth system. Current Earth system models (ESMs) still have difficulties in simulating extremes, and in reproducing abrupt transitions evidenced in paleoclimatic records. The confidence that ESMs can reliably predict changing extremes and future abrupt transitions is therefore not as high as desired. The group will further advance techniques from Machine Learning - in particular Deep Neural Networks (DNNs) and Random Forests - to develop hybrid models that combine process-based ESM components with Machine Learning approaches to improve the simulation of extremes and abrupt transitions.

Key responsibilities:
The candidates will be expected to work on one or more of the following tasks

- Develop and apply statistical methods (e.g. Bayesian inference techniques such as Markov Chain Monte Carlo sampling) to calibrate models of varying complexity, ranging from conceptual models to Earth system models of intermediate complexity (EMICs) and comprehensive ESMs
- Develop and apply DNN and other machine learning based techniques for semi-empirical modelling of relevant physical processes within the Earth system
- Identify strategies to combine process-based ESM components with machine learning approaches, with focus on joint calibration and assuring physical conservation laws

Requirements:

- Master's / PhD degree in physics, mathematics, computer science, meteorology, or a related field
- Excellent skills in programming and numerical / statistical analysis of simulated and observed data are required
- Experience either in machine learning or in working with Earth System Models is required
- Experience in working with vegetation model components in ESMs is of advantage
- Basic knowledge of paleoclimatology and meteorology is of advantage
- Willingness to travel for work (project meetings, workshops, and research visits) and take part in further training
- High level of competence in oral and written English

We offer:

- The chance to be part of an interdisciplinary collaboration of leading European research institutions
- Participation at international workshops and conferences
- A stimulating working environment in an internationally recognized research institution
- a collective pay scheme and associated benefits

We explicitly encourage women to apply. In cases of equal qualification and within the given legal scope, women will be given preference. Applications by candidates with migration background are also encouraged. Disabled candidates with equal qualifications will be regarded favorably. TUM also encourages applications by parents returning from parental leave.

Please send your full application (including cover letter, CV with list of publications, contact details of two referees, Master / PhD certificates) **as a single PDF document by Email** to ESM-jobs.asg@ed.tum.de. Applications will be considered on an ongoing basis until the positions are filled.

The size of the file should not exceed 15 MB.

For further information or to discuss the position please contact Dr. Niklas Boers by Email: boers@pik-potsdam.de.

Technische Universität München
TUM School of Engineering and Design
Department of Aerospace and Geodesy
Earth System Modelling Group
Dr. Niklas Boers
Lise-Meitner-Str. 9
85521 Ottobrunn

Data protection information: When you apply for a position at the Technical University of Munich (TUM), you are submitting personal information. Please take note of the data protection policy according to Art. 13 Datenschutz-Grundverordnung (DSGVO) on the collection and processing of personal information as part of your application. By submitting your application, you confirm that you have acknowledged the data protection information of TUM.

Hinweis zum Datenschutz:

Im Rahmen Ihrer Bewerbung um eine Stelle an der Technischen Universität München (TUM) übermitteln Sie personenbezogene Daten. Beachten Sie bitte hierzu unsere Datenschutzhinweise gemäß Art. 13 Datenschutz-Grundverordnung (DSGVO) zur Erhebung und Verarbeitung von personenbezogenen Daten im Rahmen Ihrer Bewerbung. Durch die Übermittlung Ihrer Bewerbung bestätigen Sie, dass Sie die Datenschutzhinweise der TUM zur Kenntnis genommen haben.